

ample, "a falling body hits the ground with precisely the same force as is required to lift it to the height from which it falls." He evidently means that the work done in lifting the body is equal to the energy which it will expend in falling. His instructions as to the measurement of water by weirs are too inaccurate to please a water engineer, but they are really accurate enough for the farmer's purpose. His descriptions of turbines are too complex for the farmer and they do not show great knowledge of the subject, but the farmer does not need to understand them. The author is excellent in describing how to make a dam. His description of the dynamo is quite good and easy to follow, and it will certainly interest the farmer in electricity and cause the farmer's son to study the subject more fully, not merely through books, but through simple experiments. On practical matters—types of lamps, sizes of wire, wire joints, Ohm's law, wiring the house and premises, etc.—the author gives good simple instructions. The last quarter of the book is less important; it is intended for farmers who have no water power. It describes gas-engine plant and accumulators.

The American farmers have a respect for natural science and they are glad to cultivate new ideas. We think that the publication of this book will induce such men and their families to begin a fascinating study at small cost, with results in comfort and a widening of the mental horizon which ought to fill the town dweller with envy.

PRINCIPLES OF STOCK-BREEDING.

Breeding of Farm Animals. By Prof. M. W. Harper. Pp. xvii+335. (New York: Orange Judd Co.; London: Kegan Paul and Co., Ltd., 1914.) Price 1.50 dollars.

FEW callings have been more prolific in theories than stock-breeding. Many have been erroneous, while others which have borne a strong semblance of soundness have been inapplicable. Most of them have come from stock-breeders themselves; but others, which, as a rule, have received more attention, have come from outside observers. The great stock-breeders, more especially the great improvers, have given little heed to any other theory than that which has been tersely expressed in the words "put the best to the best," but others have been influenced by other theories, although their success in the production of good stock has usually been parallel with the strength of their adherence to the main theory whether that adherence was conscious or unconscious. After the introduction of printed herd and stud books, and therefore of "pure" breeding, the

"pedigree" theory was generally taken to be a means of breeding good stock as well as "pure" stock, and only the very greatest stock-breeders stood fast by the "best to best" theory.

Like many a stock-breeder, Prof. Harper has lost sight of the main theory, and has allowed others to intervene. With him the Darwinian theory has effect as follows: "While the influence of climate and locality is great, and the factors at work are exceedingly complex, yet from a practical point of view we may consider the food supply and more favourable conditions generally, such as sufficient shelter, proper care, including training and developing, as the more important causes of variation." A paragraph is headed "Mendelism a Cause of Variation." And, after three chapters on Improvement due, 1, to "selection based on records of performance," 2, to "selection the result of prepotency," and, 3, to "cumulative development," it is stated "that the degree of development depends on the environment, including training, management, and the like." Apparently the weight of Bateson's "Materials for the Study of Variation," and Mendel's work has not yet been felt. It is no argument for the Darwinian view to say that "The thoroughbred horse has increased its speed by but eight per cent. in one half a century of racing. During this same period the standard-bred, a comparatively new breed, has reduced its trotting record by 27 per cent." The words in italics indicate some part of the argument to the contrary.

Parts of the work of Galton and Pearson are cited, but with no indication how the formulæ of these investigators, even if sound, are to be made use of by stock-breeders; and the idea that "the new individual inherits all the characters of the race to which it belongs," which is cited frequently and appears to be regarded as fundamental, is of very doubtful accuracy when applied to domestic animals. In the chapter headed "Mendel's Law of Heredity," the statements are made that "Mendel made a series of studies . . . from which he drew some general conclusions, now known as Mendel's law of heredity," and "Mendel's Law . . . depends on three factors—unit characters, dominance, and segregation." Apparently Prof. Harper has become acquainted with Mendel's Law from later writers rather than from Mendel himself.

In his volume, however, a source of information of very great importance is indicated. In the United States, careful records have been kept of the performances of the Holstein-Friesian breed of cattle, and these show that, as they had none, or one, or two parents in what is called the ad-

vanced registry, certain sires and dams had different chances of begetting progeny capable of entering the same registry. Surely if these records were closely examined and the failures counted as well as the successes, a more satisfactory theory might be promulgated as to the inheritance of milk and butter yield. The records of trotting horses have also been kept, and the belief is strong that some are the parents of performers while others are the grandparents only: the intervening generation being merely breeders of performers. Surely, again, the failures might be counted and some useful explanation of this phenomenon discovered.

JAMES WILSON.

OUR BOOKSHELF.

The Material Culture and Social Institutions of the Simpler Peoples: An Essay in Correlation. By L. T. Hobhouse, G. C. Wheeler, and M. Ginsberg. Pp. 299. (London: Chapman and Hall, Ltd., 1915.) Price 2s. 6d. net.

It is difficult, and may be dangerous, to apply statistical methods to the sociology of uncivilised peoples. There are only a few monographs written on scientific lines; the greater part of the evidence consists in the incomplete and often prejudiced accounts of travellers. Results, therefore, over a wide field, must necessarily be rough, and, to attain even these, a very skilled judgment is required. But, for all that, even rough results of very careful work are valuable.

The authors of this study in correlation wisely choose material culture as the general characteristic of civilisation. By reference to this test, they have established "an advance in organised government accompanying economic development." Similarly, with the social order generally. The chapters dealing with these results are quite masterly, and the authors have the good habit of stating fully their difficulties, and the pros and cons, in the doubtful cases. In various ways it is shown that a purely pastoral society tends to become a "blind alley" of progress. Interesting results follow the discussion of marriage and the family, especially in the cases of polygamy and the "consideration" to the kin.

Full tables of all the data used are given, and there is a complete bibliography. The book is absolutely essential to the student of social evolution. It breaks fresh ground and consolidates new positions.

Agricultural Laboratory Manual: Soils. By Prof. E. S. Sell. Pp. iv+40. (Boston and London: Ginn and Co., 1915.) Price 1s. 6d.

THIS is a collection of forty exercises on soils. The book consists of forty sheets of scribbling paper held together by paper-fasteners inside a brown paper cover, so that each sheet may be used separately by the scholars and then bound up again with the rest. Each page has a few

lines of printed directions at the top, followed in many cases by a ruled form in which the student is intended to enter his results.

The exercises are intended "for high schools, agricultural high schools, and normal schools." There is a list of apparatus required for the exercises, which includes such diverse articles as pie-tins, tomato-cans, compound microscopes, mill for pulverising soil (why not pestle and mortar?), and a compacting machine for soils, whatever that may be. The exercises themselves include the formation of soils as seen in a road or railway cutting; experiments on the separation of soil particles, their appearance and properties; the properties of sand, clay, and humus; the behaviour of water and air in the soil; cultivation, implements, fertilisers, and gardening. A teacher who lacked the knowledge or experience requisite for designing exercises himself might find some of the suggested exercises useful, but such a teacher would find himself in trouble with more than one of the exercises. No. 19, for instance, where the scholar is directed to find the percentage of air in the soil by putting a measured volume of soil in a beaker and pouring water on to it until the soil is just covered, would be likely to give very curious results. Again in exercise No. 27, a scholar who was accustomed to working with pie-dishes and tomato-tins would see all sorts of things except bacteria when "examining with a compound microscope a small sample of fertile soil placed on a slide in a few drops of water."

T. B. W.

The Evolution of the Potter's Art. By T. Sheppard. Pp. xx. (London: Brown and Sons, Ltd., n.d.)

THE pretentious title of this publication will disappoint the student in search of an adequate treatment of a difficult problem. Such a work would not be an easy task for even the most learned ethnographer, because it involves a knowledge of prehistoric and savage culture, acquaintance with the technique of work in clay, and a special familiarity with burial customs. It would be unfair to expect these qualifications in the hard-worked curator of a provincial museum. But it is sufficient to quote his comment on the discovery in pots from the so-called Danes' Graves near Driffield of the humeri of pigs: "so that we may assume that a shoulder of pork was food for the gods in the Early Iron Age." He must be aware that the joint was intended as food for the dead man's spirit. The book is really only an *édition de luxe* of one of the useful penny pamphlets which Mr. Sheppard has issued from time to time for the instruction of unlearned visitors to the museum at Hull. It is fortunate in possessing a good collection of early Staffordshire ware, with examples of the Worcester, Derby, Chelsea, Dresden, and other famous schools. From these materials the "Evolution of the Potter's Art" is worked out in six pages. The best point about the work is the series of sixty-two photographs of the more interesting specimens in the collection.